

347. The method of Claim 346 wherein the nanoparticles of the conjugates are made of gold or silver.

348. The method of Claim 337 wherein the substrate has a plurality of types of oligonucleotides attached to it in an array to allow for the detection of multiple portions of a single nucleic acid, the detection of multiple different nucleic acids, or both.

349. The method of Claim 337 wherein the substrate is contacted with silver stain to produce the detectable change.

350. The method of Claim 348 wherein the substrate is contacted with silver stain to produce the detectable change.

351. The method of Claim 337 wherein the detectable change is observed with an optical scanner

352. The method of Claim 351 wherein the device is a flatbed scanner.

353. The method of Claim 351 wherein the scanner is linked to a computer loaded with software capable of calculating greyscale measurements, and the greyscale measurements are calculated to provide a quantitative measure of the amount of nucleic acid detected.

354. The method of Claim 337 wherein the oligonucleotides attached to the substrate are located between two electrodes, the nanoparticles of the conjugates are made of a material which is a conductor of electricity, and the detectable change is a change in conductivity.

355. The method of Claim 354 wherein the electrodes are made of gold, and the nanoparticles are made of gold.

356. The method of Claim 354 wherein the substrate is contacted with silver stain to produce the change in conductivity.

357. The method of Claim 348 wherein each of the plurality of oligonucleotides attached to the substrate in the array is located between two electrodes, the nanoparticles are made of a material which is a conductor of electricity, and the detectable change is a change in conductivity.

358. The method of Claim 357 wherein the electrodes are made of gold, and the nanoparticles are made of gold.

359. The method of Claim 357 wherein the substrate is contacted with silver stain to produce the change in conductivity.

360. A method of detecting a nucleic acid having at least two portions comprising:

- (a) contacting the nucleic acid with a substrate having oligonucleotides attached thereto, the oligonucleotides having a sequence complementary to a first portion of the sequence of said nucleic acid, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the substrate with said nucleic acid;
- (b) contacting said nucleic acid bound to the substrate with a first type of nanoparticles according to any one of Claims 243-250 having one or more types of recognition oligonucleotides attached thereto, at least one of the types of recognition oligonucleotides comprising a sequence complementary to a second portion of the sequence of said nucleic acid, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the nanoparticles with said nucleic acid; and

(c) observing a detectable change.

361. The method of Claim 360 further comprising:

(d) contacting the first type of nanoparticles bound to the substrate with a second type of nanoparticles according to any one of Claims 243-250 having recognition oligonucleotides attached thereto, at least one of the types of recognition oligonucleotides on the second type of nanoparticles comprising a sequence complementary to the sequence of one of the types of oligonucleotides on the first type of nanoparticles, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the first and second types of nanoparticles; and

(e) observing the detectable change.

362. The method of Claim 360 wherein at least one of the types of recognition oligonucleotides on the first type of nanoparticles has a sequence complementary to the sequence of at least one of the types of oligonucleotides on the second type of nanoparticles and the method further comprises:

(f) contacting the second type of nanoparticles bound to the substrate with the first type of nanoparticles, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the first and second types of nanoparticles; and

(g) observing the detectable change.

363. The method of Claim 362 wherein step (d) or steps (d) and (f) are repeated one or more times and the detectable change is observed.

364. The method of Claim 360 further comprising:

(d) providing a type of binding oligonucleotides having a sequence comprising at least two portions, the first portion being complementary to at least one of the types of oligonucleotides on the first type of nanoparticles;